



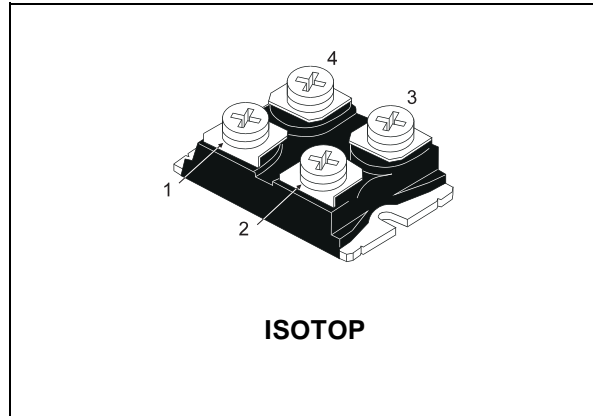
# STGE200NB60S

N-CHANNEL 150A - 600V - ISOTOP

PowerMESH™ IGBT

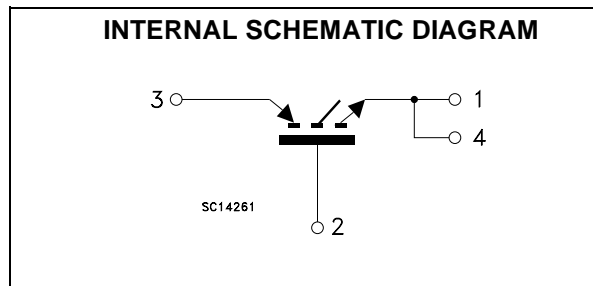
TYPE	V <sub>CES</sub>	V <sub>CE(sat)</sub> (typ.)	I <sub>C</sub>	T <sub>C</sub>
STGE200NB60S	600 V	1.2 V 1.3 V	150 A 200 A	100°C 25°C

- HIGH INPUT IMPEDANCE (VOLTAGE DRIVEN)
- LOW ON-VOLTAGE DROP (V<sub>cesat</sub>)
- OFF LOSSES INCLUDE TAIL CURRENT
- LOW GATE CHARGE
- HIGH CURRENT CAPABILITY



## DESCRIPTION

Using the latest high voltage technology based on a patented strip layout, STMicroelectronics has designed an advanced family of IGBTs, the PowerMESH™ IGBTs, with outstanding performances. The suffix "S" identifies a family optimized to achieve very low V<sub>CE(sat)</sub> (@ max frequency of 1KHz).



## APPLICATIONS

- LOW FREQUENCY MOTOR CONTROLS
- ALUMINUM WELDING EQUIPMENT

## ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V <sub>CES</sub>	Collector-Emitter Voltage (V <sub>GS</sub> = 0)	600	V
V <sub>GE</sub>	Gate-Emitter Voltage	±20	V
I <sub>C</sub>	Collector Current (continuous) at T <sub>C</sub> = 25°C	200	A
I <sub>C</sub>	Collector Current (continuous) at T <sub>C</sub> = 100°C	150	A
I <sub>CM</sub> (■)	Collector Current (pulsed)	400	A
P <sub>TOT</sub>	Total Dissipation at T <sub>C</sub> = 25°C	600	W
	Derating Factor	4.8	W/°C
T <sub>stg</sub>	Storage Temperature	- 65 to 150	°C
T <sub>j</sub>	Max. Operating Junction Temperature	150	°C

(■) PULSE WIDTH LIMITED BY SAFE OPERATING AREA

## STGE200NB60S

### THERMAL DATA

Rthj-case	Thermal Resistance Junction-case Max	0.208	°C/W
Rthj-amb	Thermal Resistance Junction-ambient Max	30	°C/W

### ELECTRICAL CHARACTERISTICS (T<sub>CASE</sub> = 25 °C UNLESS OTHERWISE SPECIFIED)

OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V <sub>BR(CES)</sub>	Collector-Emitter Breakdown Voltage	I <sub>C</sub> = 250 μA, V <sub>GE</sub> = 0	600			V
I <sub>CES</sub>	Collector cut-off (V <sub>GE</sub> = 0)	V <sub>CE</sub> = Max Rating, T <sub>C</sub> = 25 °C V <sub>CE</sub> = Max Rating, T <sub>C</sub> = 125 °C			500 5	μA mA
I <sub>GES</sub>	Gate-Emitter Leakage Current (V <sub>CE</sub> = 0)	V <sub>GE</sub> = ±20V, V <sub>CE</sub> = 0			±100	nA

ON (1)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V <sub>GE(th)</sub>	Gate Threshold Voltage	V <sub>CE</sub> = V <sub>GE</sub> , I <sub>C</sub> = 250μA	3		5	V
V <sub>CE(sat)</sub>	Collector-Emitter Saturation Voltage	V <sub>GE</sub> = 15V, I <sub>C</sub> = 100 A V <sub>GE</sub> = 15V, I <sub>C</sub> =150 A, T <sub>J</sub> =100°C		1.2 1.2	1.6	V V

### DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g <sub>fs</sub>	Forward Transconductance	V <sub>CE</sub> = 15 V, I <sub>C</sub> = 100 A		80		S
C <sub>ies</sub> C <sub>oes</sub> C <sub>res</sub>	Input Capacitance Output Capacitance Reverse Transfer Capacitance	V <sub>CE</sub> = 25V, f = 1 MHz, V <sub>GE</sub> = 0		15600 1100 95		pF pF pF
Q <sub>g</sub> Q <sub>ge</sub> Q <sub>gc</sub>	Total Gate Charge Gate-Emitter Charge Gate-Collector Charge	V <sub>CE</sub> = 480V, I <sub>C</sub> = 100 A, V <sub>GE</sub> = 15V		560 70 170		nC nC nC
I <sub>CL</sub>	Latching Current	V <sub>clamp</sub> = 480 V T <sub>J</sub> = 125°C, R <sub>G</sub> = 10 Ω	300			A

### SWITCHING ON

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
t <sub>d(on)</sub> t <sub>r</sub>	Turn-on Delay Time Rise Time	V <sub>CC</sub> = 480 V, I <sub>C</sub> = 100 A R <sub>G</sub> = 2Ω, V <sub>GE</sub> = 15 V		64 112		μs μs
(di/dt) <sub>on</sub> E <sub>on</sub>	Turn-on Current Slope Turn-on Switching Losses	V <sub>CC</sub> = 480 V, I <sub>C</sub> = 100 A R <sub>G</sub> =2Ω V <sub>GE</sub> = 15 V, T <sub>J</sub> = 125°C		1800 12		A/μs mJ

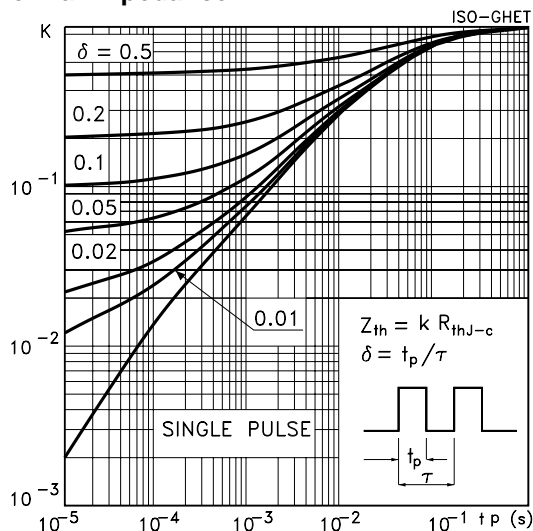
### ELECTRICAL CHARACTERISTICS (CONTINUED)

## SWITCHING OFF

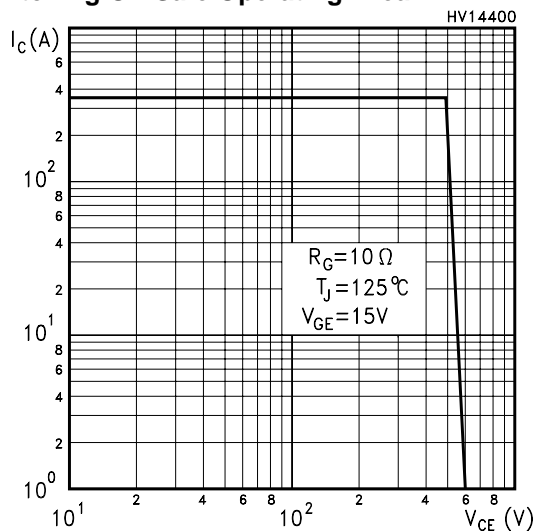
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_c$	Cross-over Time	$V_{CC} = 480 \text{ V}$ , $I_C = 100 \text{ A}$ , $R_{GE} = 2 \Omega$ , $V_{GE} = 15 \text{ V}$		2.98		$\mu\text{s}$
$t_r(V_{off})$	Off Voltage Rise Time			1.7		$\mu\text{s}$
$t_d(off)$	Delay Time			2.4		$\mu\text{s}$
$t_f$	Fall Time			1.23		$\mu\text{s}$
$E_{off(**)}$	Turn-off Switching Loss			59		mJ
$E_{ts}$	Total Switching Loss			71		mJ
$t_c$	Cross-over Time	$V_{CC} = 480 \text{ V}$ , $I_C = 100 \text{ A}$ , $R_{GE} = 2 \Omega$ , $V_{GE} = 15 \text{ V}$ , $T_J = 125 \text{ }^\circ\text{C}$		4.52		$\mu\text{s}$
$t_r(V_{off})$	Off Voltage Rise Time			2.6		$\mu\text{s}$
$t_d(off)$	Delay Time			2.8		$\mu\text{s}$
$t_f$	Fall Time			1.8		$\mu\text{s}$
$E_{off(**)}$	Turn-off Switching Loss			92		mJ
$E_{ts}$	Total Switching Loss			105		mJ

Note: 1. Pulsed: Pulse duration = 300  $\mu\text{s}$ , duty cycle 1.5 %.  
 2. Pulse width limited by max. junction temperature.  
 (\*\*)Losses include Also the Tail (Jedec Standardization)

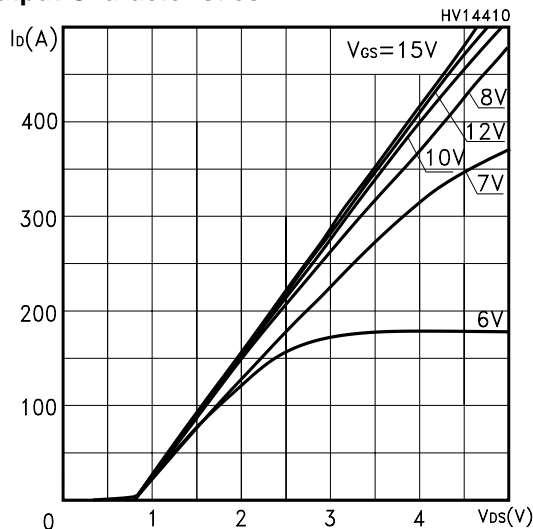
**Thermal Impedance**



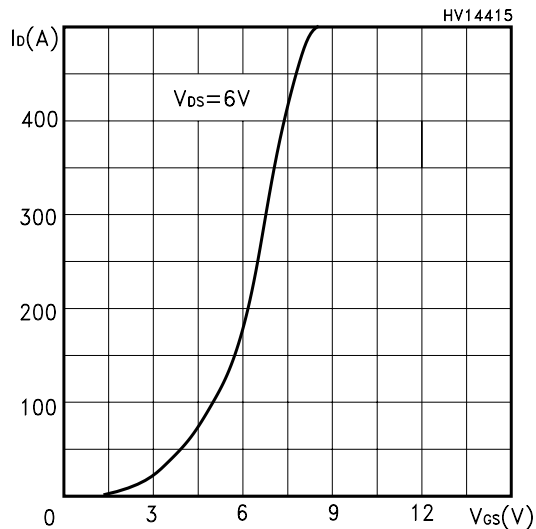
**Switching Off Safe Operating Area**



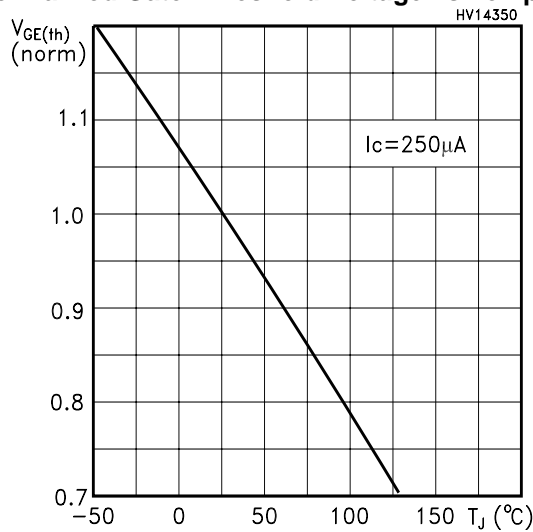
**Output Characteristics**



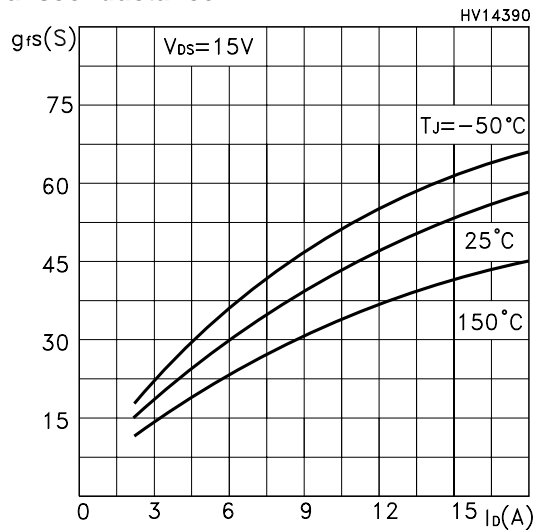
**Transfer Characteristics**



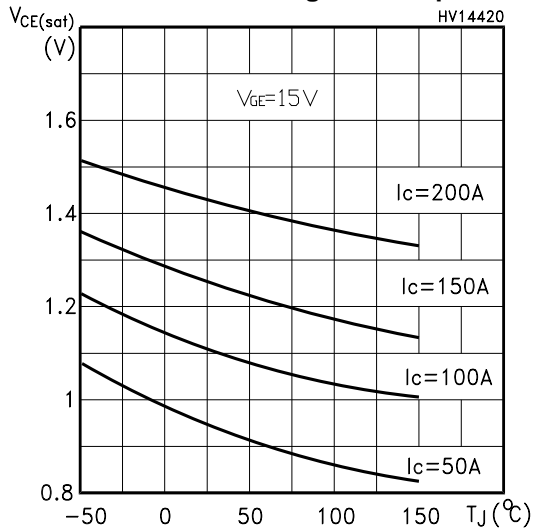
**Normalized Gate Threshold Voltage vs Temp.**



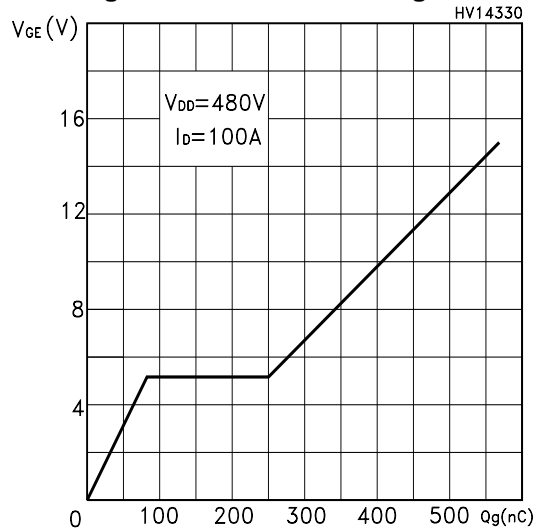
**Transconductance**



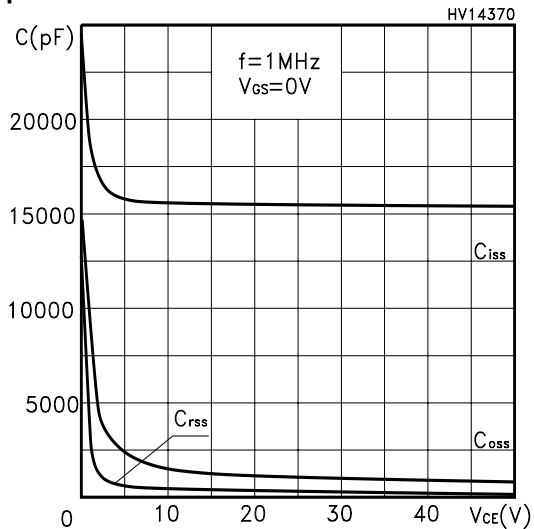
**Collector-Emitter On Voltage vs Temperature**



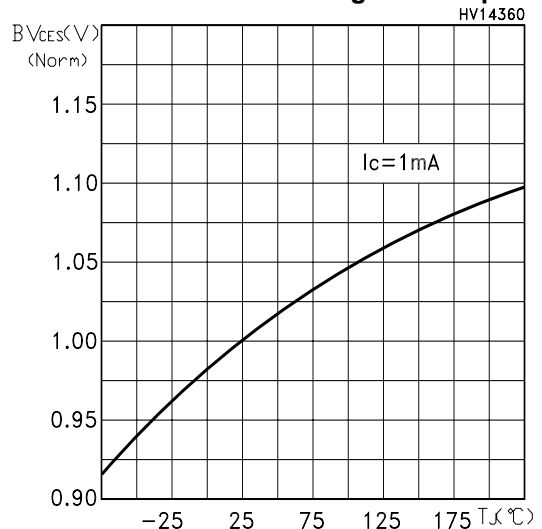
**Gate-Charge vs Gate-Emitter Voltage**



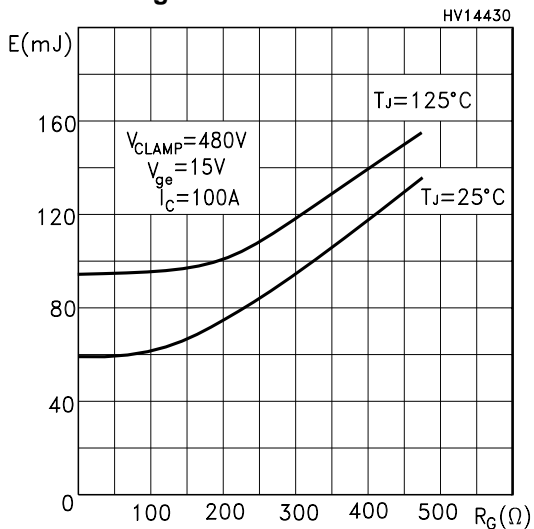
**Capacitance Variations**



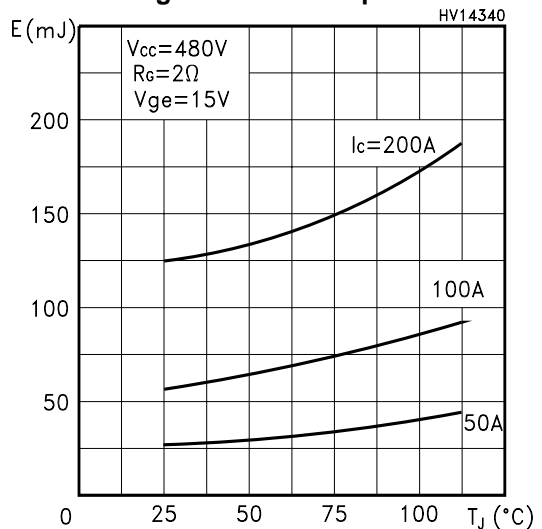
**Normalized Break-down Voltage vs Temp.**



**Total Switching losses vs Gate Resistance**

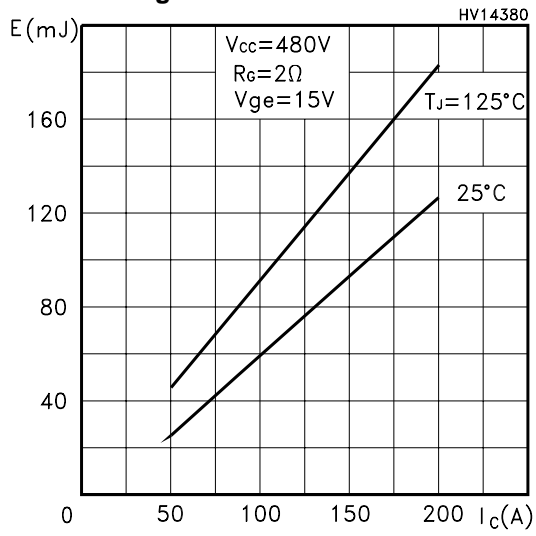


**Total Switching losses vs Temperature**

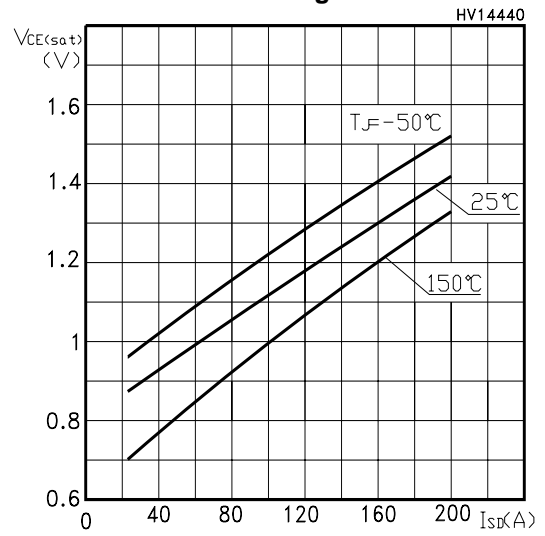


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### Total Switching losses vs $I_c$



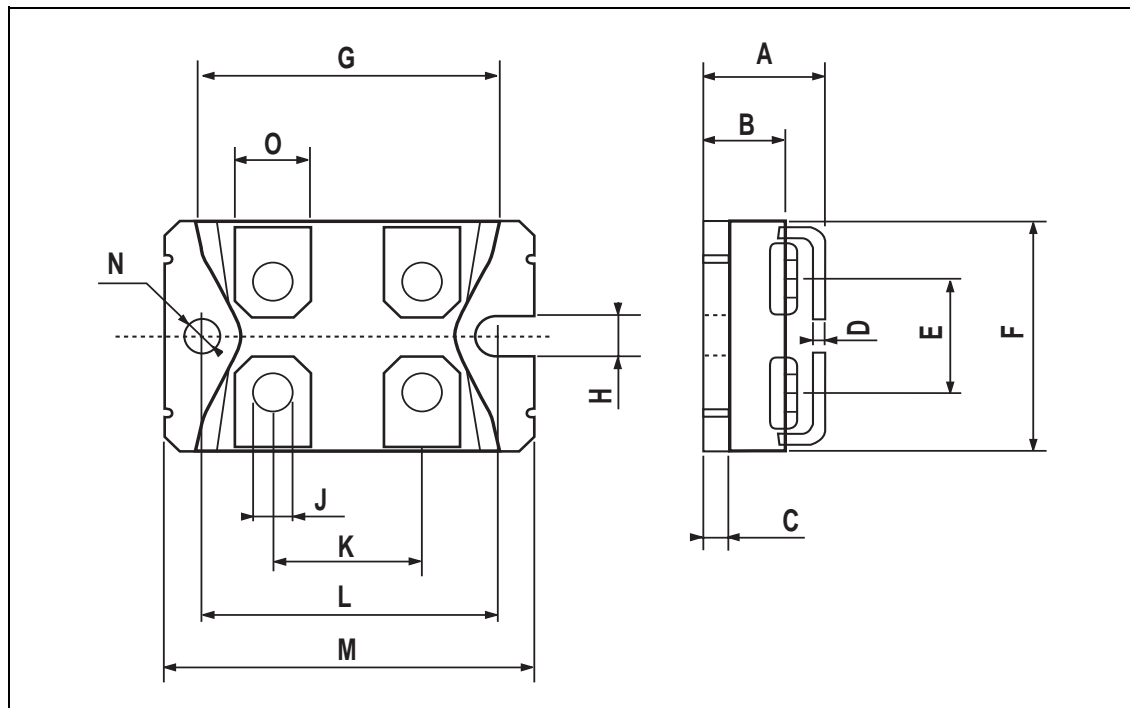
### Collector-Emitter on Voltage vs Current





ISOTOP MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	11.8		12.2	0.466		0.480
B	8.9		9.1	0.350		0.358
C	1.95		2.05	0.076		0.080
D	0.75		0.85	0.029		0.033
E	12.6		12.8	0.496		0.503
F	25.15		25.5	0.990		1.003
G	31.5		31.7	1.240		1.248
H	4			0.157		
J	4.1		4.3	0.161		0.169
K	14.9		15.1	0.586		0.594
L	30.1		30.3	1.185		1.193
M	37.8		38.2	1.488		1.503
N	4			0.157		
O	7.8		8.2	0.307		0.322





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